COLLEGE OF ENGINEERING, PUNE

(An Autonomous Institute of Government of Maharashtra)

END-SEMESTER EXAMINATION

F.Y.M.TECH.

(Specialization: Physical Met. PY-517 and Process Met. PM-513)

NUCLEAR MATERIALS

Year : 2011-2012 Term : Second

Max. Marks : 50 Time: 3 Hours

INSTRUCTIONS:

1) Attempt Any FIVE Questions.
2) All Questions carry equal marks.
3) Figures shown on the right hand indicate marks assigned for sub-questions.

Q.1. Explain the following in brief:

a) Variation in Binding Energy per Nucleon with respect to Mass Number and its significance. 05

b) Criticality of a nuclear reactor and its dependence on various factors. 05

Q.2 a) Why is light water is the most suitable material as a moderator for LWR type of reactors ? What are its drawbacks? 05

b) What are zircaloys ? Discuss in brief how zircaloys proved to be the principal material for fuel cladding and fuel coolant channels in PWR and for pressure tubes in PHWR. 05

Q.3 a) Explain why it is necessary to employ control rods in nuclear reactors. Describe, in brief, various methods employed for control in the nuclear reactors. 05

b) What is the role of a coolant in a reactor? Enumerate

the desired characteristics of a suitable coolant. Major choice all around the world for LMFBR is that of liquid sodium. Why? 05

Q.4 a) P_u^{239} is one of the fissile materials. What is its source? Why use of plutonium in a fast reactor more attractive than its use in thermal reactors? 05

b) It has been accepted that plutonium in the metallic form would not be suitable as a fuel in the reactor when compared with its oxide, PuO_2. Give reasons. 05

Q.5 a) How does thorium occur? How will be the vast reserves of thorium of Indian origin will be utilised for nuclear power generation? 05

b) How do α and β particles and γ radiation interact with the matter? What are the shielding materials employed in the reactors which provide protection from adverse effects of these radiations? 05

Q.6 a) What is a fusion reaction? It is considered that fusion reaction is a promising source of energy of the future. Give your critical comments. 05

b) Explain how highly active solid and liquid nuclear wastes are treated and disposed off. 05

Q.7 Write critical notes in brief on any two of the following:

a) Salient features of nuclear power reactors in India.

b) Recent trends in Reactor Technology.

c) Indian fast breeder reactors: present status and future projections.

d) Processes employed for production of heavy water in India.

5 each

College of Engineering, Pune 5.

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End -Semester Examination

F.Y. M. Tech. (Metallurgical Engineering)

MT- 5103 Advanced Metal Casting

Year: 2011-12

Time 3 Hrs] [Max. Marks 50

Instructions to candidates:

1) Neat diagrams must be drawn wherever necessary.
2) Assume suitable data if necessary.
4) Use of logarithmic tables, non-programmable calculators is allowed.

		Marks
Q. 1	With neat sketch explain the different sections in a foundry.	5
Q. 2	Compare between shell molding, Carbon di-oxide molding and investment molding practice.	5
Q. 3	What do you mean by riser efficiency? What are the different ways to improve the same?	5
Q. 4	Define any 5 defects that arise in castings with causes and remedies for the same.	5
Q. 5	Which are the different parameters should be considered while designing a gating system?	5
Q. 6	Describe any one case study in foundry in detail.	5
Q. 7	Write short note on of the following: 1. Al alloy foundry practice. 2. Centrifugal casting technique. 3. Green sand molding practice. 4. mold coatings 5. Sand control tests.	10
Q.8	Explain in brief following terms during solidification of castings : Crystallization Nucleation and Growth Dendrites – secondary arm spacing. Coring/segregation	10

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COLLEGE OF ENGINEERING, PUNE
END SEMESTER EXAMINATION 2012
M Tech (Physical Metallurgy & Production)
Advanced Materials Processing (PY 516)

8 May 2012 Duration: 3 Hrs
Time: 9 am -12 noon Max. Marks: 50

Instruction: Draw neat figures to support your answers.

Q.1	a	Explain and justify the use of metal matrix composites in automobile engineering applications.	6
	b	What is the role of organic coatings in corrosion protection?	4
Q.2	a	Explain principle of physical vaopur deposition, its types and their application in details.	6
	b	Write a note on thermal barrier coating.	4
Q.3	a	What do you understand by smart materials? State their uses in engineering applications.	6
	b	Write a note on super plastic materials.	4
Q.4	a	Design a nickel based super alloy composition and its processing for fabricating gas turbine blade that will have a particularly long creep-rupture life at temperatures approaching 1100 ^{0}C.	6
	b	Write a note on metallic glass.	4

Q.5 a Describe any two strengthening mechanism in metallic materials giving their use in practical applications. 6

b What are ultrahigh strength steels? Explain their processing for commercial applications. 4
